

Improper Disposal of Medical Wastes in Clinics: An Impact of Waste Volume

Daisuke Sugimoto¹, Fumitake Takahashi^{1*},

1: Tokyo Institute of Technology, G5-13, 4259, Nagatsuta, Midori-ku, Yokohama, 226-8503 Japan

*corresponding author: takahashi.f.af@m.titech.ac.jp

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INTRODUCTION

Infectious wastes are defined as *wastes generated from medical institutions, which contain pathogens that are infectious or potentially infectious to humans and wastes that are pathogens attached or may be attached* (Miyazaki and Une, 2005). For disposal, infectious wastes are packed in specially designed durable and sharp-safe containers, and the containers must be properly discharged according to the guidelines. (Ministry of the Environment Japan, 2018). On the other hand, improper discharge like incomplete sealing, container deformation, over-weighted, and container contamination accidentally occurs. It has been greatly uncertain that how frequently these improper discharges happen and what causes the inappropriate disposal. In addition, medical waste discharge from small clinics has been also uncertain. This study firstly investigated medical waste discharge from clinics and its improper disposal. An impact of waste volume on improper discharge, in particular incomplete sealing and container deformation, was analyzed.

MATERIALS AND METHODS

Data collection of medical waste discharge from clinics

Medical waste discharge data were collected for one year from April 1st, 2018 to March 31st, 2019. Figure 1 shows the locations of surveyed medical institutions in Tokyo metropolitan area. Each container was inspected based on sealing completeness and container non-deformation. The volume of medical wastes categorized to proper/improper sealing and container non-deformation/deformation. To analyze an impact of waste volume on improper discharge, two-sided Welch's *t*-test was used to check the significant differences of discharged waste volumes.

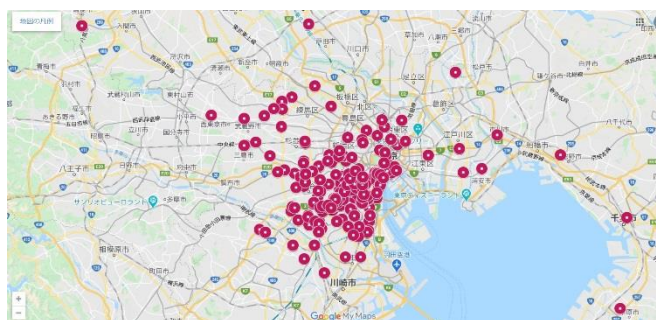


Fig. 1 Location of surveyed clinics

RESULTS AND DISCUSSION

Average discharge volume and relative frequency distribution

Average discharge volume of clinics, animal clinics (veterinary), nursing homes, and dental clinics are shown in Fig. 2. Average discharge volumes of clinics and veterinary clinics are 411 L/year and 808 L/year, respectively. Dental clinics discharge less volume of wastes than others. The relative frequency distribution of discharge volume is shown in Fig 3. The most frequent discharge volume is 21 to 40 L/year. It suggests that small clinics discharge around 1 to 5 containers in one year. Limited frequency of container discharge suggests longer interval time of container discharge, which might weaken training effect of proper container discharge.

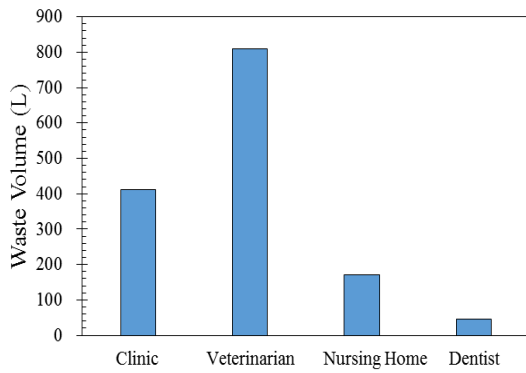


Fig. 2 Average discharge volume by clinic types

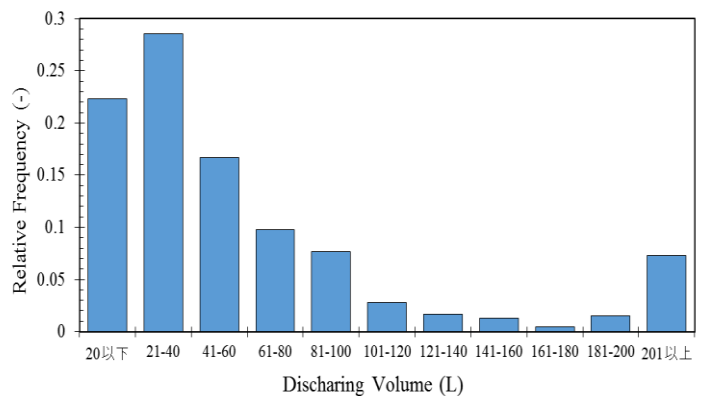


Fig. 3 Relative frequency of discharge volume

The impact of discharge volume on improper sealing and container deformation

If overpacking of medical wastes to small containers to save discharge fee causes improper sealing and container deformation, it should generate clear difference of waste volumes between proper discharge cases and improper cases. They are compared and shown in Fig.4 for improper sealing and Fig.5 for container deformation, respectively. In the case of improper sealing, the average volume of improper is significantly smaller than that of improper sealing cases ($P < 0.001$). On the other hand, the average volume of container deformation cases is significantly larger than that of normal (non-deformation) cases ($P < 0.046$). As expected above, it was firstly verified by a statistical analysis that overpacking of medical wastes to small containers caused improper sealing. Larger average volume of container deformation cases is reasonable because large container has less mechanical durability than small one. Although large volume container is better to inhibit overpacking, it will cause higher possibility of container deformation when overpacked.

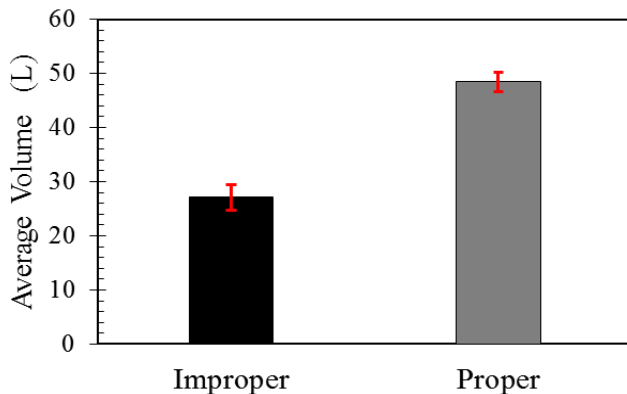


Fig. 4 Average waste volume of improper and proper sealing cases

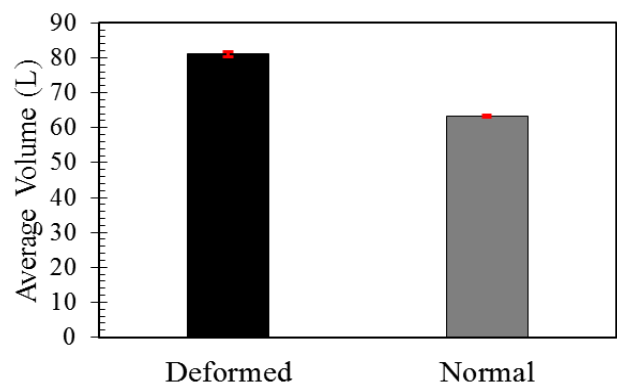


Fig. 5 Average waste volume of deformed and normal cases

CONCLUSION

This study statistically confirmed that overpacking of medical wastes to small containers to save discharge fee caused improper sealing and container deformation. Although large volume container is better to inhibit overpacking, it will cause higher possibility of container deformation when wastes are overpacked.

REFERENCES

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